Case Report

Transversus Abdominis Plane Neurolysis with Phenol in Abdominal Wall Cancer Pain Palliation

Rodolfo Gebhardt, MD[1], and Kenneth Wu, MD[2]

From: [1]MD Anderson Cancer Center, Houston, TX; and [2]Baylor College of Medicine, Houston, TX

Dr. Gebhard is Associate Professor, Department of Pain Medicine, MD Anderson Cancer Center, Houston, TX; Dr. Wu is a Resident at Baylor College of Medicine in Houston, TX.

Address correspondence:
Rodolfo Gebhardt, MD
MD Anderson Cancer Center
1515 Holcombe Blvd
Box 409
Houston, TX 77030
E-mail:
rgebhardt@mdanderson.org

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Pain is commonly perceived by patients during cancer and its treatment. Although most patients respond to conservative management implemented according to the World Health Organization guidelines, a subset of patients with advanced disease develop intractable pain that may require additional interventions such as regional blocks and intrathecal therapy. Patients with terminal abdominal or pelvic cancer who have high tumor burdens are often offered a diagnostic visceral nerve block followed by neurolysis for pain palliation. Conventional visceral blocks usually require fluoroscopic guidance for correct needle placement in the vicinity of the neuroaxis or abdominal cavity. These techniques carry risks of injury to vessels, bowels, and nerves. Transversus abdominis plane (TAP) block is a technique that is easy to perform (particularly when ultrasonographic guidance is used), has a good safety record, and effectively reduces pain levels and opioid requirements after abdominal and gynecological surgery. Although numerous studies have demonstrated the effectiveness of TAP blocks in acute pain management, the role of TAP block in chronic pain management is very limited. We believe that chemical neurolysis with phenol can prolong the effects of analgesia in patients with terminal cancer. We describe a case of terminal abdominal sarcoma with intractable pain that responded well to a TAP block followed by TAP neurolysis. The patient tolerated the procedure well and demonstrated sustained analgesia for 45 days before dying of the disease. We also demonstrated that TAP block significantly reduces the total opioid requirement as demonstrated by the morphine equivalent daily dose score after the neurolytic procedure. This result supports our belief that TAP block with TAP neurolysis is an effective and inexpensive modality that can be used to palliate intractable abdominal wall pain in patients with terminal abdominal cancer.

Key words: Cancer pain management, phenol neurolysis, chemical neurolysis, transversus abdominis plane block, cancer pain palliation, intractable abdominal pain, ultrasound guided

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Pain is a common symptom of cancer that causes significant physical and psychosocial burdens. As the disease progresses and the tumor burden increases, patients often report increases in pain with subsequent decreases in quality of life (1). Although most of these patients can be provided with acceptable pain relief by implementation of the 3-step World Health Organization cancer pain guidelines, a subset of patients have intolerable side effects from systemic analgesic therapy and may achieve optimum pain relief from interventional procedures (2). Alternative modalities such as intrathecal analgesics, regional blocks, spinal cord stimulation, and neurolytic blocks are often considered for these patients. In particular, neurolysis of the celiac plexus and hypogastric plexus are commonly performed to palliate advanced abdominal cancer pain.

Transversus abdominis plane (TAP) block is a novel regional anesthesia technique that has become more commonly used in the last decade. Its primary targets

are the branches of the spinal nerves that arise from the T7 to T12 nerve roots and from the Ilioinguinal nerve as they course along the fascial plane between the internal oblique and transversus abdominis muscles (3). Anatomically, these nerves innervate the skin and muscles of the anterior abdominal wall and the area over the inguinal ligament. In the classic blind approach to the transversus abdominis plane, these nerves are accessed through the Petit triangle, an area bordered by the iliac crest, latissimus dorsi muscle, and external oblique muscle (4). Local anesthetics are used to induce sensory anesthesia over the area of the abdominal wall while sparing the peritoneum and the viscera (5). However, the classic blind technique has only a 23.4% chance of correct needle placement in the neurovascular plane and an 18% risk of peritoneal placement (6). These risks are significantly attenuated by performing blocks under ultrasound guidance. Ultrasonography-guided TAP blocks are easy to perform and allow the clinician to quickly identify relevant structures and visualize injectate spread. Owing to their relatively low risk of complications (7) and ease of performance, ultrasonography-assisted TAP blocks have been increasingly recognized as a treatment modality for postoperative pain management in surgical cases that involve the abdominal wall. TAP block benefits include lower postoperative numeric rating scale (NRS) scores and lower postoperative analgesic consumption than those of conventional pharmacologic management (8). Its efficacy has been demonstrated in both adult and pediatric patients who underwent lower abdominal procedures such as hysterectomy, appendectomy, and ovarian cystectomy (9). Many studies demonstrate the efficacy of this technique in acute pain management of surgical patients; however, its demonstrated role in the management of chronic pain is limited. In this case study, we evaluated the effect of TAP block with TAP block neurolysis in the palliative management of a cancer patient with intractable abdominal pain.

Case Report

Patient

A 55-year-old woman with epithelioid sarcoma of the mons pubis and inguinal lymphadenopathy was initially seen in April 2011 at our institution's sarcoma clinic to discuss treatment options. She received neoadjuvant gemcitabine and docetaxel with radiation therapy followed by exploratory laparotomy, lysis of adhesions, and resection of the retroperitoneal sarcoma. Later, in November 2011, tumor surveillance with magnetic resonance imaging showed disease recurrence with bulky retroperitoneal adenopathy. The patient had visited the emergency room 4 times in 2 months for intractable abdominal pain that necessitated parenteral opioids. She was referred to our pain clinic in January 2012 for persistent, intractable abdominal pain. She reported colicky, intermittent, cramping abdominal pain that was focal and nonradiating from the umbilicus down to the pubic bone. Her pain on the NRS scale ranged from 3/10 to 7/10, with an average of 5/10. The pain was described as crampy, gnawing, and aching, worsened with eating, and improved with walking, medications, and heat. For pain relief, she had been prescribed 2 mg of hydromorphone by mouth every 4 hours as needed and 0.25 mg of hyoscyamine by mouth every 6 hours. On average, she need 12 mg of hydromorphone per day. Another marked complaint was constipation, for which she took milk of magnesia and polyethylene glycol. Her oral intake of solid and liquids was severely limited by pain and constipation.

The patient was offered an intrathecal trial with the aim of implanting an intrathecal delivery system, but she was not interested in any further surgical procedures. She was then offered bilateral neurolysis of the inferior hypogastric plexus with a goal of optimizing pain control while reducing her opioid-induced constipation and food intolerance. She consented to the neurolysis. During positioning for the procedure, the patient could not tolerate lying prone because of intractable abdominal wall pain. The pain team proceeded with bilateral ultrasonography-guided TAP blocks to alleviate the abdominal wall pain. Upon completion of the TAP blocks, the patient reported near-complete resolution of her abdominal wall pain. She then underwent bilateral inferior hypogastric neurolysis with phenol to treat the visceral component of her abdominal pain.

Upon follow-up 3 weeks later, the patient stated that she had maintained almost total pain relief for one week, and then the pain had returned to pretreatment level, with an average NRS of 5/10. Her constipation was resolved. The diagnosis at the time was probable somatic abdominal wall pain secondary to tumor infiltration. She underwent repeat bilateral TAP blocks to confirm the diagnosis. Within 30 minutes of the procedure, she reported a substantial reduction in pain to a NRS score of 2/10. Two days later, she underwent ultrasonography-guided bilateral TAP neurolysis with phenol and had a good analgesic response. She was prescribed 5 mg of methadone every 12 hours and 10 mg of oxycodone every 4 hours as needed for breakthrough pain. The patient was in-

structed to return to the clinic should the pain recur.

During the last week of February 2012, the patient was prescribed adjuvant doxorubicin and ifosfamide for tumor burden reduction. Pain assessment during chemotherapy sessions showed NRS pain scores of 0/10. During the first week of March 2012, the patient was admitted to the inpatient service with a temperature of 101.4°F and new development of abdominal ascites. Paracentesis was used to remove 2 L of fluid, which was found to contain tumor cells. The pain management regimen during this hospital stay consisted of intravenous patient-controlled analgesia at 0.2 mg of hydromorphone every 10 minutes as needed; she used one to 2 demand doses per 24 hours during the next 12 days of hospitalization with average NRS scores of 0/10 to 3/10. She was re-admitted 2 days after discharge for shortness of breath and abdominal distention and was found to have bilateral pleural effusions and accumulation of ascites. She developed significant respiratory failure requiring admission to the intensive care unit in early April 2012, and after discussion with her family, the patient made a "do not resuscitate" request; she died the next day secondary to anasarca and respiratory failure. Her NRS scores while in the intensive care unit were 0/10 to 3/10, and the pain was well controlled with one to 2 doses of 0.5 mg of intravenous hydromorphone every 24 hours.

TAP Block and Phenol Neurolysis Technique

Under direct ultrasonographic guidance, we identified the right external oblique, internal oblique, and transversus abdominis muscles and their associated fascial layers (Fig. 1). A 22-gauge 2-inch Havel's EchoStim needle was advanced under ultrasonographic guidance until it entered the TAP. After negative blood aspiration, 15 mL of 6% phenol with 20% glycerin was injected (Fig. 2). We then imaged the left side of the abdomen and repeated an identical procedure.

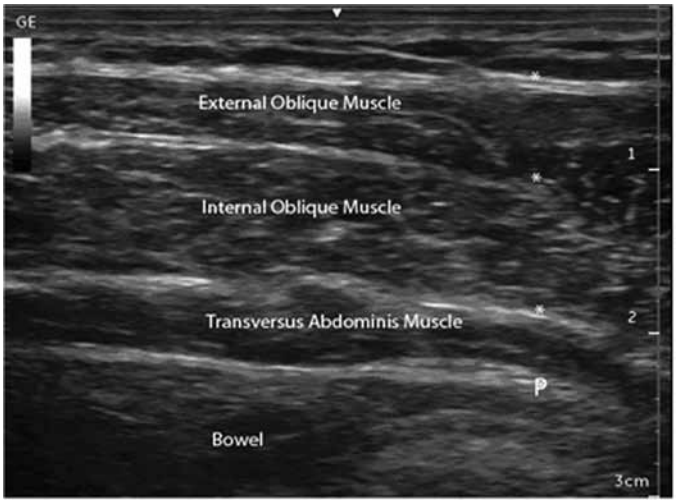

Fig. 1. *Pre-injection image. *Fascial planes. P; Peritoneum.*

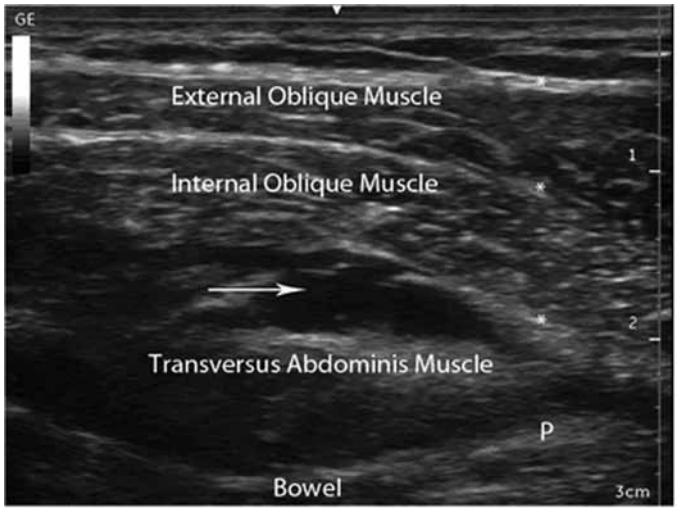

Fig. 2. *Post-injection image.*
**Fascial planes. P: Peritoneum. Arrow: Phenol pocket.*

Discussion

Pain occurs in up to 70% of patients with advanced cancer, and 46% of these patients report inadequate pain management. Twenty percent of the patients who have advanced cancer and inadequate pain management do not respond to conservative management as dictated by the World Health Organization cancer pain guidelines (10,11). Under-treatment of pain causes a lowered quality of life and unnecessary suffering in patients with terminal cancer.

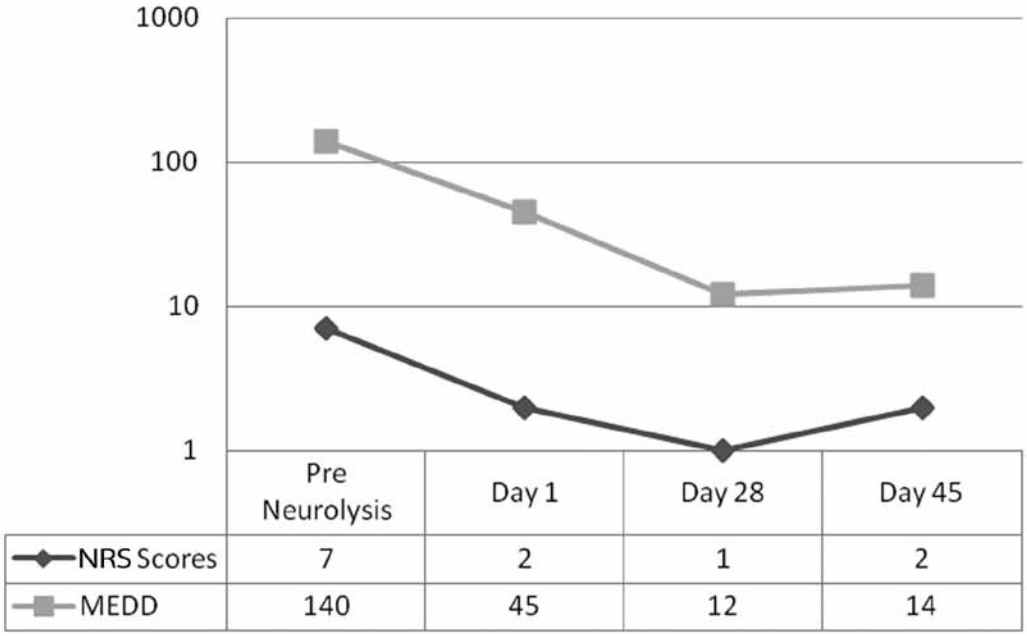

Fig. 3. *Numerical Analog Pain Score and morphine-equivalent daily dose (MEDD) versus time.*

The patient in this study seemed to be an ideal candidate for ultrasonography-guided TAP block and neurolysis. We believe that the diagnostic TAP blocks established that the pain was mainly from somatic rather than from visceral nociceptive stimuli. Tissue staining studies in cadavers have shown that TAP blocks affect only nerves that innervate the abdominal wall and thus confer only somatic blockade (5). The spread of dye reliably covered nerve fibers from T10 to L1, with variable coverage from T7 to T9, as was also shown in the cadaver dye studies.

We used ultrasonographic guidance to allow the operator to correctly identify the abdominal muscle layers and fascial plane, pass the needle into the correct plane in real time, and visualize the spread of phenol. We demonstrated that with this technique, this patient had substantial improvement in NRS but is also less commonly called NAS}scores with the initial blockade, with local anesthetics and triamcinolone for 7 days. To prolong the effect of the block, we performed chemical neurolysis.

Phenol is a chemical composite containing carbolic acid, phenic acid, phenylic acid, and benzoic acid derivatives. These compounds cause nerve destruction by inducing protein precipitation, which causes loss of cellular fatty elements, separation of the myelin sheath from the axon, and axonal degeneration (12). The onset of analgesia with phenol neurolysis is approximately 3 to 6 days, and its mean duration is 6 to 12 months. Neurolysis with phenol also has an immediate local anesthetic effect due to its immediate selective effect on smaller sensory nerve fibers while sparing larger motor fibers (12). Neurolysis with phenol causes less pain on injection and less local tissue irritation than with ethanol.

The reduction in pain scores and the opioid requirements demonstrates the effectiveness of TAP neurolysis over time. The initial time point one day after the procedure demonstrated a modest reduction in pain scores and opioid requirements. This result is most likely due to the residual local anesthetic-like actions of phenol. At 28 days after the procedure, the patient demonstrated a 2-fold drop in self-reported pain scores and a 10-fold drop in opioid requirements. The analgesic effect was sustained for 45 days prior to her dying of cancer (Fig. 3).

Although phenol neurolysis is relatively benign, adverse events have been reported, including neuritis, nausea, vomiting, central nervous system stimulation, cardiac arrhythmias, respiratory arrest, and paraplegia (13). Isolated TAP block complications, including needle trauma, intraperitoneal injection,

neural ischemia, inadvertent intravascular injection, and local anesthetic toxicity, have been reported in only 6 cases (7,14). Our patient reported no side effects.

Numerous articles have described the effectiveness of ultrasonography-guided TAP block in reducing pain scores and opioid consumption; the majority of these studies concluded that the effective analgesic period is 24 to 48 hours. The brevity of this period has limited this technique to postoperative patients. However, in chronic pain patients, a longer duration of analgesia is often necessary. Efforts have been made to prolong the TAP block duration. A literature search yielded only 2 other case reports in which the TAP approach was utilized for managing chronic abdominal pain. These studies used different methods to prolong the blockade. Guirguis et al (15) reported success in treating chronic non–cancer-related abdominal pain with a continuous TAP block catheter for 2 weeks. Sakamoto et al (16) described a case in which TAP block and neurolysis with 33% ethanol were performed in a patient with metastatic colon cancer; that case report was limited by the short duration of follow-up due to the patient's terminal illness, making it difficult to assess the duration of the block. Our study confirms that TAP neurolysis can achieve a prolonged block that is useful in palliation of abdominal cancer pain in selected patients.

Conclusion

TAP block is a novel regional block technique that has been proven beneficial in the management of acute abdominal wall pain in postsurgery patients, but its role in chronic pain management is limited by the brevity of its effect after a single injection. Two attempts have been made to augment the duration of the block by either continuous TAP catheterization or induction of neurolysis with ethanol. Both of those case reports demonstrated that the duration of the block can be substantially extended but had significant limitations. We demonstrated that TAP block and neurolysis with phenol is an alternative method for treating patients with intractable abdominal wall pain toward the end of life. We showed that even with a single phenol injection, we are able to achieve sustained analgesia and a reduction in opioid consumption that was still effective 45 days after the procedure. Larger studies are warranted to assess this procedure's efficacy, side effects, and complications.

Disclosures/Conflict of Interest

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